

LETTERS TO THE EDITOR.

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Daylight Saving?

MAY I make a few observations with regard to Prof. Milne's article in NATURE of April 6 on Daylight Saving? Leaving aside the inquiry as to whether the clerks of Cornwall are happier than those of Kent, to which I am not able to give an answer (though it is possible that, as these counties differ in other respects than that considered, a mere yes or no might have little value as evidence), one may direct attention to the next argument as to workers who have to commence their work at 6 in the morning. The graphic account which Prof. Milne gives as to the hardships which these workers would have to suffer under the proposed scheme, would be heart-rending, had he not thoughtfully supplied the remedy in his last paragraph. Why should they not start work an hour later in summer? later, that is, according to the new setting of the clocks? This is a "simple solution" on Prof. Milne's own showing.

In my practical engineering days I found that one of my greatest privations was due to the fact that my evenings had to terminate (in order that I might rise early in the mornings) earlier than those of my friends, and evening engagements were generally inconveniently late. Now, under the proposed scheme all evening engagements, except such as are organised by these workers for their own convenience, would take place an hour earlier (absolute time), and consequently the effect of the change would be probably, if anything, an advantage to the 6 o'clock workers, provided they accepted the simple solution suggested. In fact, their day is *now* disjointed from that of the rest of the world, and under the new scheme this defect would be at least partially remedied.

Prof. Milne's fifth paragraph seems to be inconsistent with his simple solution. I am surprised to hear the "half-asleep" argument seriously brought forward. If one rises and retires an hour earlier, but works, takes meals, &c., at the old times, the argument is valid, but not, I think, when work, &c., fall in automatically with the new times of rising and retiring. On a journey to Vancouver and back I altered my watch more than twenty times, but felt no inconvenience whatever, because all engagements altered in the same way.

As to defects, inconvenience to meteorologists, steamship companies, &c., we must, of course, try to weigh these as justly as possible against the advantages of the scheme, but I think that technical and academic points, and even practical questions like the adjustment of steamship and boat-train times, should not be allowed to weigh very heavily against any large amount of real advantage to the workers of the country which the scheme might be calculated to afford.

With regard to the last paragraph of the paper, one may remark that the solution suggested, that business people should begin work an hour earlier in summer, really leads us on inevitably to the daylight proposal itself. For if business (apart from factories, &c., with which I have already dealt, which form an obvious exception) begins and ends an hour earlier, then the general activities of the country must follow suit. It would be impracticable, for instance, for shops to open at 7 instead of 8 and close at 6 instead of 7 (say) at night, while the shopping public still ordered their doings according to the old times; and if all business and other people adopted the plan suggested, then all other pursuits engaged in by them must follow. Thus all engagements, trains, and what not must be altered.

Now, manifestly, by far the simplest mode of carrying out this change would be to alter the clocks, and then allow all the activities of life to go on to the same time schedule as before. Not only is this the simplest way, but I think it will be admitted that it is the *only* way which would have the slightest chance of being *actually realised* in practice.

In conclusion, I may say that my object in writing has

not been to support the daylight saving proposal itself, but rather to direct attention to what seemed to me to be vulnerable points in the arguments (as arguments) under discussion.

L. SOUTHERNS.

IN my note on the so-called Daylight Saving proposal, I repeated a suggestion made by many, viz., that a simple solution to the whole question would be to commence work one hour earlier during the summer, and do this without confusing ourselves and others without altering the clocks. Why Mr. Southern says quotes me as saying *one hour later* I do not know. The main point, however, to which practically no reference is made is that the majority of workers in Great Britain will, if the time-saving scheme comes into force, have to rise at 4 a.m. instead of 5 a.m. for six months in the year. This is increasing darkness and not saving daylight. It is all very well to say that the total population in Great Britain will, if they go to bed one hour earlier, save two and a half million pounds on illumination, but it would only be fair if the promoters of this new-fangled idea would tell the inhabitants of Great Britain how many millions they would have to spend on extra illumination required in the morning. You cannot make a piece of cloth longer by cutting off one end and sewing it on the other.

Mr. Southern says that he is "surprised" at hearing what he aptly terms the "half-asleep argument." To be surprised at an argument, however, is not the best way to refute it. Thus I may be surprised, even greatly astonished, at much that Mr. Southern says in his letter, but I do not expect that the most dramatic exhibition of my personal feeling will carry conviction to his or anyone else's mind. I am therefore compelled to relate a few facts which have a direct bearing on this matter. Of these facts Mr. Southern is evidently without knowledge, and it may be assumed that others who support this remarkable Bill are in a like state of darkness.

In the first place, as the result of innumerable experiments and observations by many distinguished investigators, it has been definitely ascertained that bodily and mental efficiency are not maintained at the same level throughout the day, and that the course of efficiency, if plotted diagrammatically, describes a curve with a morning maximum between ten and eleven; an afternoon maximum about five, and in late workers a third elevation, which has been termed "end-glow." With the afternoon and evening measures of efficiency I am not concerned; what I wish to emphasise here is that there is a gradual increase in bodily and mental efficiency from the hour of waking up to between ten and eleven in the great majority of workers of all kinds; i.e. that sleep imposes an inertness the influence of which passes away, only slowly on arising. There is, in fact, what Dr. Howard Marsh, in an interesting book on "The Diurnal Course of Efficiency," calls a "warming-up period."

Now for the important matter of habit. The results of experiments show that the immediate effect of breaking habits is apt to be detrimental to the output of work, whatever that habit may be. So firmly does habit impress itself upon the reaction of man to his environment, that Patrick and Gilbert, for instance, show that in subjects kept awake for seventy-two hours, and subjected to tests every six hours, the worst results were obtained invariably *at the periods ordinarily devoted to sleep*, thus showing the recurrent nature of an established habit, and how important is the influence of this upon the output of work, hence for some time after the shifting of time, should it be brought about, we should anticipate that the efficiency of workers would be impaired.

J. MILNE.

Seiches in Windermere.

WINDERMERE is peculiar as regards seiches, since it is nearly divided in two by islands and shallow water near the middle. On account of this the two halves of the lake oscillate independently, but an oscillation can be detected which is due to the uninodal seiche of the whole lake. Because of the shallow water near the middle, this has only a small amplitude and a very long period (69.7m.), and is soon damped out.

A recording apparatus was first set up near the upper

end of the lower half of the lake. The water, however, was shallow in this part of the lake, and the records are rather disturbed by local effects due to wind. The periods of the seiches detected here were 20.4 minutes, 11.9 minutes, and 3.3 minutes. The 20.4-minute and 11.9-minute periods are due to the uninodal and binodal seiches of the lower half of the lake. The 3.3-minute period is probably

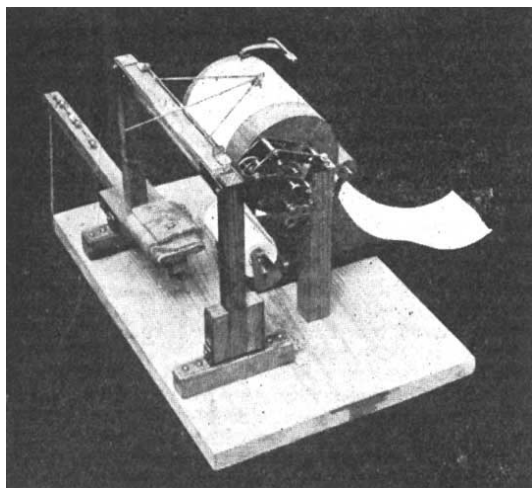


FIG. 1.—Recording Limnograph.

due to a transverse seiche. The maximum range recorded was about an inch.

After this, the recording apparatus was set up at the head of the lake. The upper half of the lake being much deeper than the lower half, better records were obtained. The maximum range recorded was about $1\frac{1}{4}$ inches. The periods here were well marked, and had the following times:—69.7 minutes, due to the uninodal seiche of the whole lake; 14.1 minutes and 6.6 minutes, due to the

and 3 are typical traces obtained at the head of the lake. Nos. 4 and 5 are obtained from No. 3 by Prof. Chrystal's method of residuation. The 3.4-minute period is seen in the original trace. No. 4 shows the 14.1-minute and 69.7-minute periods, and is obtained by residuating out the 3.4-minute and 6.6-minute periods. No. 5 shows the 6.6-minute and the 69.7-minute periods, after the 3.4-minute and the 14.1-minute periods have been residuated out. In Nos. 1 and 2 the rate of movement of the paper was one inch in 18.8 minutes, and in No. 3 one inch in 23.2 minutes.

During the later experiments a form of apparatus was used which proved quite satisfactory, and, being simple to construct, may be worth briefly describing. A strip of paper, from a continuous roll fixed on the base of the instrument, passes up and over a horizontal wooden cylinder, 3 inches in diameter, and driven by clockwork. After passing half-way round the cylinder, the paper passes under a small roller carried on springs. This roller presses the paper against the wooden cylinder, and, since the paper passes half-way round the cylinder before passing under the roller, there is no possibility of it slipping.

A horizontal lever is pivoted to the base of the instrument, one end of which projects outwards, and is connected to the float by a string, while the other end carries a weight. The pen and holder are carried by a horizontal rod, which is supported by two upright arms, being fixed to them at each end by pivots. One of these arms is fixed to the lever, at the place where it is pivoted to the base of the instrument, while the other arm is pivoted direct to the base. As the float moves up and down, this horizontal rod moves backwards and forwards, parallel to the axis of the wooden cylinder. On the horizontal rod are bearings, which carry the light frame holding the pen, which rests on the top of the wooden cylinder. When the lever is half-way up or down, the bearings of the pen are about the same height as the top of the wooden cylinder, then, as the float moves the lever up and down, the pen moves in an almost straight line across the paper on the top of the cylinder.

This apparatus is simple to construct, and, since the only friction is in the pen and the four pivots, the whole system moves very freely, and a float 5 inches in diameter will work it easily, while Chrystal's "waggon" recorder requires a 10-inch float.

GORDON DOBSON.

Caius College, Cambridge, April 19.

The Flight of Exocoëtus.

PRACTICAL difficulties will prevent the settlement of the question as to whether or no a flying fish supports itself by movement of its fins by the method suggested by a correspondent in NATURE of February 9, viz. kinematograph photography.

Anatomy and phylogeny converge to the support of those observers who declare that the "wings" are motionless during "flight."

(1) Any resemblance to the huge musculature of birds is out of the question, but if the wings vibrate to any purpose, something resembling in scale the muscular and nervous specialisation found in insects should obtain here. Has anything of the sort been found? On the contrary, the muscular development of Exocoëtus is, like that of other fish, directed to propulsion by the tail.

(2) The structure and habits of the lower members of the family, Hemiramphus and Belone, indicate stages in the evolution of Exocoëtus. The former is able to make great leaps nearly parallel to the surface, of such force, indeed, that the natives here tell me of men who have been pierced by the elongated lower jaw two inches deep in the flesh of the leg when wading among them. "When it is out of the water it is quite mad and strikes whatever is in the way, whether a man or a boat, and so kills itself," to quote their description.

Belone can almost fly, its effort having the appearance of running on the surface on the tip of its tail, suggesting some use of this member, but not of the normal-sized fins, in extending the range of "flight." These two steps in the evolution of the habit of Exocoëtus distinctly lead to the

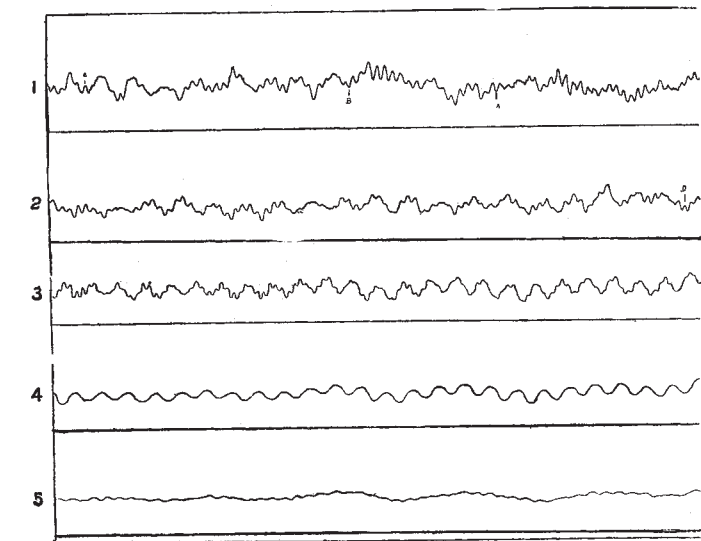


FIG. 2.—Traces obtained at Head of Windermere.

uninodal and binodal seiches, respectively, of the upper half of the lake; also a well-marked, short period of 3.4 minutes. This last period is probably due to the trinodal seiche, and also to a transverse seiche, which has nearly the same period. In some cases, the movement due to this oscillation alone was nearly an inch.

The figure shows some of the traces obtained. Nos. 1, 2, NO. 2165, VOL. 86]